Morven South Offshore Wind Array Project

Environmental Impact Assessment Report

Volume 2, Chapter 15: Aviation (Military and Civil)

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15 Aviation (Military and Civil)

15.1 Introduction

15.1.1.1 This chapter of the Morven South Offshore Wind Array Project (hereafter "Morven South") Environmental Impact Assessment (EIA) Report (hereafter, the EIA Report) presents the assessment of the likely significant effects (as per the EIA Regulations as defined in Volume 1, Chapter 2: Policy and Legislation) on aviation (military and civil). Specifically, this chapter considers the potential impacts of Morven South seaward of Mean High Water Springs (MHWS) during the construction, Operations and Maintenance (O&M) and decommissioning phases. Where relevant, this chapter also assesses the LSE[1] of Morven South on receptors landward of MHWS during the construction, O&M and decommissioning phases.

15.1.1.2 The assessment presented in this chapter has relied upon, or informed the following technical chapters and reports:

- Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report;
- Volume 3, Annex 15.2: Aviation (Military and Civil) Shared Instrument Flight Procedures (IFP) Assessment.

15.1.1.3 This Aviation (Military and Civil) EIA chapter provides a detailed description of military and civil aviation and radar activity within the area of Morven South and the northern North Sea region which surrounds the Morven South Boundary.

15.1.1.4 Aviation (Military and Civil) was reported on in the Scoping Report for the Morven Option Lease Agreement Site (hereafter the "Morven Site Scoping Report"). (Morven Offshore Wind Limited (MvOWL), 2023). As described in Volume 1, Chapter 3: Site Selection and Consideration of Alternatives, the Morven Option Lease Agreement Site (hereafter "Morven Site") has since been divided into two smaller projects, Morven North and Morven South Offshore Wind Array Project (hereafter "Morven South").

15.1.1.5 The potential impacts to aviation (military and civil) are considered to generally be the same (or less) for Morven South as identified in the Morven Site Scoping Report for aviation (Military and Civil). The advice provided by the Marine Directorate Licensing Operations Team (MD-LOT) in the Morven Site Scoping Opinion (MD-LOT, 2023) relevant to Morven South, has therefore been considered for the development of this chapter.

15.1.1.6 This chapter presents and assesses up to date parameters for Morven South and explains if and how any assessment aspects differ from the information set out in the Morven Site Scoping Report.

15.2 Study area

15.2.1.1 A single study area has been defined for aviation (military and civil):

- The Morven North and Morven South Regional Aviation (Military and Civil) Study Area (hereafter the "Regional Aviation (Military and Civil) Study Area").

15.2.1.2 The study area defined for aviation (military and civil) is shown in Figure 15.1 and defined as follows:

- The Regional Aviation (Military and Civil) Study Area is driven by the Zone of Influence (ZoI). To identify and characterise aviation and radar receptors, a broad aviation and radar study area has been defined, based on recommendations provided by the Civil Aviation Authority (CAA) Civil Aviation Publication (CAP) 764 Policy and Guidelines on Wind Turbines (CAA, 2016).
- CAP 764 (CAA, 2016) provides criteria for assessing whether any offshore wind development might have an impact on aerodrome and radar related operations. Consideration of the Morven South to impact aviation and radar receptors has been undertaken in accordance with the recommended consultation distance of within 30km of an aerodrome with a surveillance radar

facility, as stated in CAP 764 (CAA, 2016). However, CAP 764 (CAA, 2016) states that the relevant safeguarding consultation zone for an aviation radar system is dependent on the type of radar used and the surveillance operations the radar is used to support. For example, the en-route ATC PSR of NATS (En-Route) plc (NERL) have an operational range of around 200 kilometres (km); the Ministry of Defence (MOD) Air Defence Radar (ADR) have an operational range of over 400km radius; airfield aviation radar may operate out to a range in excess of 70km radius subject to sufficient radar and communication coverage.

- The Regional Aviation (Military and Civil) Study Area covers the aviation radar systems that potentially detect the maximum (highest) wind turbine blade tip height of 363m above mean sea level (AMSL). The Regional Aviation (Military and Civil) Study Area encapsulates the Morven South Boundary, and applicable airspace between Morven South and the United Kingdom (UK) mainland from the location of the NERL operated Allanshill Primary Surveillance Radar (PSR) to the north and the MOD operated Brizlee Wood Remote Radar Head (RRH) ADR to the south.

15.2.1.3 The study area for Aviation (Military and Civil) for the Morven South Boundary was presented and agreed during the scoping process for the Morven Site. The underlying principles used to define the study area(s) for Morven South have not changed, other than the limits have been applied relative to the Morven South Boundary, rather than the Morven Site boundary. The study area for Morven South for Aviation (Military and Civil) was presented to and confirmed by MD-LOT via a "Targeted Consultation Exercise" undertaken in Quarter 1, 2025 and as detailed in Table 15.4. Figure 15.1 illustrates the Regional Aviation (Military and Civil) Study Area.

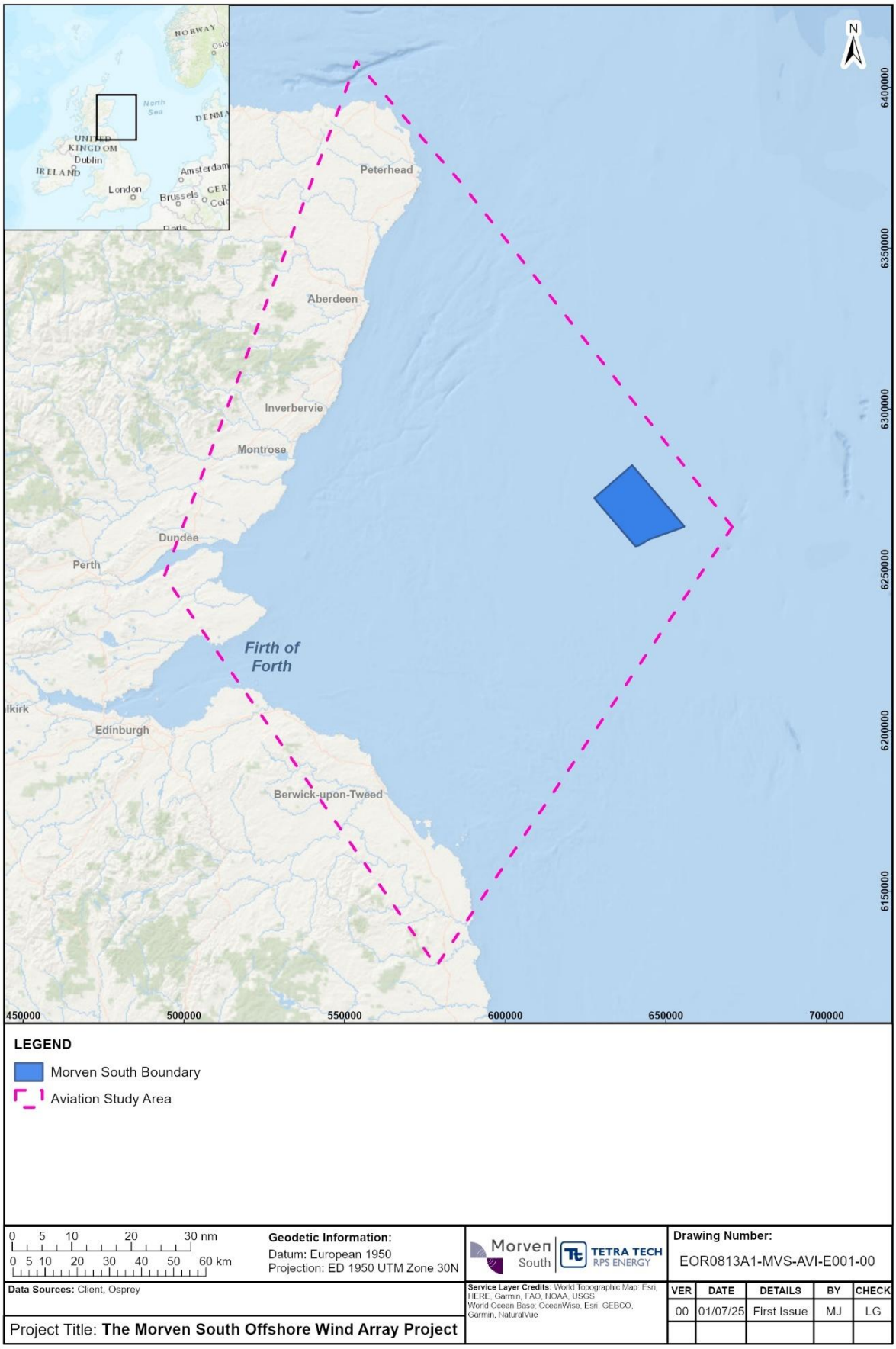

Figure 15.1: Aviation (Military and Civil) Regional Study Area for Morven South

15.3 Legislative and policy context

15.3.1.1 Policy and legislation on renewable energy infrastructure is presented in Volume 1, Chapter 2: Policy and Legislation. Policy and legislation specific to aviation (Military and Civil), is contained in the CAA CAP 393 The Air Navigation Order (ANO) (CAA 2016, as amended 2022) which sets out the provisions of the ANO as amended together with the legislation made under the Order. A summary of the legislative provisions as provided in the ANO are provided in Table 15.1 below. Relevant legislative national policy provisions are set out in Table 15.2. Table 15.3 provides a summary of national guidance provisions of relevance to aviation (military and civil).

Table 15.1: Summary of legislative provisions within The Air Navigation Order (2016a as amended 2022) of relevance to aviation (military and civil)

Summary of relevant legislation	How and where considered in the EIA Report
CAP 393 The Air Navigation Order, Article 223 provides the regulation of the requirement to fit aviation lighting to wind turbines located in United Kingdom waters.	The fitment of aviation lighting to the Morven South wind turbines is considered in Table 15.12.

Table 15.2: Summary of legislative provisions within National Policy Provisions of relevance to aviation (military and civil)

Summary of relevant legislation	How and where considered in the EIA Report
National Planning Framework (NPF4)	Acknowledges the need to support the aviation industry and its contribution to the Scottish economy, while also promoting sustainable practices. Engagement with aviation stakeholders was completed with an aim of mutual operation of renewable wind energy and safe aviation operations. Table 15.4 provides the consultation completed.
Scottish National Marine Plan (NMP) (Scottish Government, 2015). To maintain operational effectiveness in Scottish waters used by the armed services, development and use will be managed in areas utilised by the MOD. The MOD may establish by-laws for exclusions and closures of sea areas in the interest of national defence. If there is a conflict with other users, appropriate mitigation will be identified and agreed with the MOD, prior to planning permission, a marine licence, or other consent being granted.	The potential impact to MOD operations is identified in Section 15.7. The significance of the effect of Morven South is addressed in Table 15.19.
Sectoral Marine Plan (SMP) for Offshore Wind Energy (Scottish Government, 2020). Potential negative impacts to aviation activities have been identified, the Scottish Government will undertake further and ongoing engagement with the developers of offshore renewable projects. Consultation with aviation stakeholders including NERL, the MOD and Maritime and Coastguard Agency (MCA) is required. Consultation with the	Consultation with aviation stakeholders is identified in Table 15.4.

Summary of relevant legislation	How and where considered in the EIA Report
MCA is being progressed to support the Shipping and Navigation Chapter of the EIA.	

Table 15.3: Summary of National Guidance Provisions of relevance to aviation (military and civil)

Summary of relevant guidance	How and where considered in the EIA Report
International Civil Aviation Organisation (ICAO) Annex 14 Aerodromes Design and Operations contains Standards and Recommended Procedures (SARPs) (ICAO, 2022) provides international standards and recommended practices for aerodrome design and operations. The edition details the physical characteristics, Obstacle Limitation Surfaces (OLS) as well as specifications for managing obstacles outside of aerodrome safeguarded surfaces.	Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment considers airfield safeguarded surfaces. Section 15.7.1.3 provides a consideration of potentially impacted IFP.
CAA CAP 032: UK Integrated Aeronautical Information Package (IAIP) (CAA, 2025) provides information on facilities, services, rules, regulations and restrictions in UK airspace.	The consideration of all potentially impacted receptors is identified in Section 15.7.
CAA CAP 168: Licensing of Aerodromes (CAA, 2022) is the guidance document for aerodrome operators and gives details of the minimum requirements for licensed aerodromes.	Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment considers licensed airfields. Section 15.7.1.3 provides a consideration of potentially impacted IFP.
MCA Marine Guidance Note (MGN) 654: Safety of Navigation Offshore Renewable Energy Installations (OREIs) (MCA, 2021) highlights issues that need to be taken into consideration when assessing the impact on navigational safety and emergency response (search and rescue) caused by offshore renewable energy installation developments.	Table 15.12 considers lighting, marking and layout of wind turbines of the Morven South Boundary.
CAA CAP 670: Air Traffic Services Safety Requirements (CAA, 2019) provides an overview of requirements and the regulatory framework as well as requirements and guidance for air traffic services.	The consideration of all potentially impacted receptors is identified in Section 15.7.
CAA CAP 738: Safeguarding of Aerodromes (CAA, 2020) offers guidance to those responsible for the safe operation of an aerodrome or a technical site, to help them assess what impact a proposed development or construction might have on that operation.	Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment considers the safeguarding of airfields. Section 15.7.1.3 provides a consideration of potentially impacted airfields.
CAA CAP 764: Policy and Guidelines on Wind Turbines (CAA, 2016) provides CAA policy and guidance on wind turbines potential effect on aviation that will need to be considered by aviation stakeholders, wind energy developers and planning authorities when assessing the viability of wind turbine developments.	The consideration of all potentially impacted receptors is identified in Section 15.7.
CAA CAP 774: The UK Flight Information Services (CAA, 2021) provides guidance for pilots on the types of air traffic services that are available to all flights operating within Class G uncontrolled airspace.	Section 15.2 considers establishment of the study area.

Summary of relevant guidance	How and where considered in the EIA Report
CAA CAP 785B: Implementation and Safeguarding of Instrument Flight Procedures (IFP) in the UK (CAA, 2022a) publication of the specific requirements for the development and approval of IFP designs, and the delivery of safeguarding services.	Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment considers the safeguarding of airfields. Section 15.7.1.3 provides a consideration of potentially impacted airfields.
CAA CAP 999: Helicopter Search and Rescue (SAR) in the UK National Approval Guidance (CAA, 2023) assists operators intending to conduct civil Search and Rescue helicopter operations in the UK.	Table 15.12 considers tertiary mitigation of the Morven South Boundary.
ICAO Document 8168 Ops/611 Procedures for Air Navigation Services - Aircraft Operations (PANS-Ops) (ICAO, 2009) refers to ICAO's procedures for air navigation services, specifically focusing on aircraft operations.	Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment considers the safeguarding of airfields. Section 15.7.1.3 provides a consideration of potentially impacted airfields.

15.4 Consultation

15.4.1.1 The approach to consultation for Morven South is set out in Volume 1, Chapter 5: Consultation. A summary of the issues raised during consultation activities undertaken to date specific to aviation (military and civil) is presented in Table 15.4, together with how these issues have been considered in the production of this Aviation (Military and Civil) EIA Report Chapter. Further detail is presented within Volume 3, Annex 5.1: Consultation.

Table 15.4: Summary of key consultation issues raised during consultation activities undertaken for Morven South of relevance to aviation (military and civil)

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
02 August 2023	Edinburgh Airport: Scoping Opinion	The Morven Site is outside of the airport safeguarding zone; the airport has no objection to the project.	See Section 15.5 for impacts scoped in and out of the assessment.
17 August 2023	NATS: Scoping Opinion	The Morven Site is predicted to impact the NATS operated Allanshill and Perwinnes PSR systems and have an unacceptable operational impact on Prestwick Centre, Aberdeen and Military ATC.	See Section 15.5 for impacts scoped in and out of the assessment. Volume 3, Annex 15.2 provides detail of the IFP assessment completed.
21 August 2023	Aberdeen Airport: Scoping Opinion	• Potential for interference to airport PSR caused by radar detection of the operational wind turbines. • Potential to impact published airport IFP due	See Section 15.5 for impacts scoped in and out of the assessment. Volume 3, Annex 15.2 provides detail of the IFP assessment completed.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		to the creation of obstruction.	
02 January 2024	MOD Scoping Opinion	• Impact to RRH Buchan ADR. • Impact to military low flying operations created by obstruction. • Request for aviation lighting to be fitted. • MOD confirmed no impact to PEXA and the Leuchars PSR. • Potential to impact highly surveyed routes	The MOD confirmed by email on the 29 January 2025 that the MOD has no concerns for highly surveyed routes. See Section 15.5 for impacts scoped in and out of the assessment.
17 July 2025	Response to Engagement	The Met Office has no concerns for Morven South.	See Section 15.5 for impacts scoped in and out of the assessment.
21 July 2025	MD-LOT Targeted Consultation Response	MD-LOT has reviewed the information contained in the Applicant letter of 13 March 2025 and note MvOWL's proposed way forward. MD-LOT is of the view that there are no additional aspects for MvOWL to consider however, as a result of the revised consenting strategy, MD-LOT would advise discussing further with NatureScot with regards to the cumulative and in-combination assessments and in light of the recent discussion that took place during the quarterly update meeting held on 02 July 2025.	This table contains the response provided by stakeholders at Scoping and afterwards.
21 July 2025	MD-LOT response to the Applicants proposed approach to mitigation and post-consent plans.	MD-LOT is content with MvOWL's proposed approach to mitigation and post-consent plans and would request that the appropriate level of detail is provided at the application stage, such that would enable stakeholders to have early sight of the plans and the opportunity to comment at that stage. MD-LOT would also highlight the new guidance on mitigation and monitoring plans which must be submitted at application stage as previously highlighted to	Section 15.11 provides mitigation principles.

Date	Consultee and type of consultation	Summary of issue(s) raised	Applicant's response to issue raised and, if applicable, where considered in this chapter
		MvOWL during quarterly update meetings.	

15.5 Scope of the assessment

15.5.1 Impacts scoped into the assessment

15.5.1.1 The scope of this EIA Report has been developed in consultation with relevant statutory and non-statutory consultees as detailed in Table 15.4. The assessment includes all aviation stakeholders whose operations have the potential to be impacted by Morven South, taking into account the scoping and consultation process. Table 15.5 summarises the potential impacts which have been scoped into this assessment. Where an impact is likely to occur within a specific development phase of the project, this is indicated within each relevant topic chapter (a '✓' is used to denote the phase the potential impact can occur, conversely a 'X' outlines there is no impact within this project phase), where relevant.

Table 15.5: Potential impacts scoped into the Aviation (military and civil) assessment

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Potential impact	Phase			Activity
	C	O	D	
Creation of a physical obstacle - potential physical obstruction to aviation low flying operations due to height and number of above sea level infrastructures within the Morven South Boundary.	✓	✓	✓	Presence of construction infrastructure and installation of wind turbines and Offshore Substation Platforms (OSPs).
				Presence and operation of wind turbines and above sea level infrastructure within the Morven South Boundary.
				Presence of decommissioning infrastructure and decommissioning of wind turbines and OSP.
Operational wind turbines causing interference on aviation radar systems – Air Traffic Control (ATC) and Air Defence Radar (ADR) may be unable to provide an effective surveillance service due to interference on radar displays.	x	✓	x	Detection of the operational wind turbines by aviation radar systems leading to a potential of reduced radar sensitivity which may reduce the effectiveness of radar to an unacceptable level.

15.5.2 Impacts scoped out of the assessment

15.5.2.1 A summary of the impacts scoped out, together with justification for scoping them out and whether the approach has been agreed with key stakeholders through either scoping or consultation, is presented in Table 15.6.

Table 15.6: Impacts scoped out of the assessment for aviation (military and civil)

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

"✓" denotes the impact has been scoped out for this phase, "X" denotes the impact has not been scoped out for this phase

Potential impact	Phase			Justification
	C	O	D	
Impact on aviation radar systems	✓	x	✓	Wind turbine derived radar clutter will only be apparent when the wind turbines are operational and detectable by radar. Mitigation of aviation radar will remain place for so long as there is an operational requirement for aviation radar in the provision of relevant services or until the requirement to ensure surveillance systems are windfarm tolerant are assumed by the aviation stakeholder or if later until wind turbines are decommissioned and stop rotation
Impacts to Secondary Surveillance Radar (SSR) systems	✓	✓	✓	The CAA have stated within CAP 764 (CAA, 2016) that impact may occur to aviation SSR systems located within 10km of a wind farm. There are no aviation SSR systems located within the CAA provided radius. The MOD or NERL have not considered SSR systems in the response to Scoping.
Impact to MOD highly surveyed routes	✓	✓	✓	MOD do not consider there will be an impact to highly surveyed routes; as confirmed by email from MOD to the Applicant on 29 January 2025.
Impacts to Leuchars Station	✓	✓	✓	The Morven South Boundary lies outside the Leuchars Area of Responsibility (AoR) as confirmed by the MOD by email to the Applicant on 29 January 2025.
Impact to Aberdeen Airport IFP	✓	✓	✓	The Applicant assessed published Aberdeen Airport published IFP. The assessment confirms that there will be no effect on the published IFPs for Aberdeen Airport (Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment). Confirmation of agreement from Aberdeen Airport of the conclusions of the IFP Report are awaited.
Impact to military Practice and Exercise Areas (PEXA) through the creation of an obstruction	✓	✓	✓	The Morven South Boundary is located outside of the vertical extent of military PEXA as confirmed by email from the MOD to the Applicant on 29 January 2025.
Creation of an obstruction and impact to offshore helicopter operations supporting oil and gas operations	✓	✓	✓	Helicopters supporting offshore oil and gas, in the northern North Sea, use Helicopter Main Route Indicators (HMRI) radiating from Aberdeen Airport (the main support base) on a hub/spoke radial pattern flying to offshore installations/platforms. Morven South lies 16.0 nautical miles (nm) from the closest HMRI. The CAA recommend within CAP 764 (CAA, 2016) that there should be no obstacles within 2nm either side of the centreline of a HMRI, The Morven South Boundary is located outside of the CAA recommended obstacle free distance.

Potential impact	Phase			Justification
	C	O	D	
Transboundary impacts	✓	✓	✓	Morven South is located within UK airspace within the UK FIR. The UK CAA wholly sets the policy and is the UK regulator for all UK airspace therefore as Morven South lies completely in the UK FIR no transboundary impact is predicted and has been scoped out from further assessment.
Impact to Met Office Weather Radar	✓	✓	✓	The Met Office to not consider there will be an impact to Met Office Weather Radar systems, as confirmed by email from the Met Office to the Applicant on 17 July 2025.

15.6 Approach to baseline characterisation

15.6.1.1 The aviation (Military and Civil) baseline environment has been characterised through a literature review of key desktop datasets and reports (see Table 15.7). This list is not exhaustive; further datasets and reports are covered in more detail within Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report and Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment. In addition, engagement with aviation and radar stakeholders has been carried out to aid the collection of baseline information.

15.6.2 Relevant guidance

15.6.2.1 Table 15.4 provides a description of the national guidance relevant to aviation and radar.

15.6.3 Desktop study

15.6.3.1 Information on aviation (military and civil) within the Regional Aviation (Military and Civil) Study Area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 15.7 below.

Table 15.7: Summary of key desktop reports used to characterise the aviation (military and civil) baseline

Title	Source	Year	Author
The Military Aeronautical Information Publication (Mil AIP)	The Ministry of Defence	2025	The Mil AIP (MOD, 2025) is defined by the ICAO as a publication "intended primarily to satisfy international requirements for the exchange of aeronautical information of a lasting character essential to air navigation".
CAA CAP 032: UK Integrated Aeronautical Information Package (IAIP)	CAA	2025	CAP 032 provides information on facilities, services, rules, regulations and restrictions in UK airspace.
CAA 1.500,000 Visual Flight Rules (VFR) Aviation Chart Edition 36 (CAA 2025)	NATS	2025	The NATS Aeronautical Information System (AIS) team manages changes to aeronautical features on the UK VFR charts (CAA, 2025) from numerous data sources, many of which operate within a regulated framework and many of which do not.
UK En-Route Low Altitude North Sea West Offshore Installations (UK (L)) 5 OIL (MOD, 2025a)	The Ministry of Defence	2025	MOD Aeronautical Information Distribution Unit (AIDU); Military low altitude aviation chart (MOD, 2025a) showing civil and military airspace constructs, routes, exercise areas and offshore surface entities.

15.6.4 Site specific surveys

15.6.4.1 No site specific surveys have been undertaken to inform the EIA for Aviation (Military and Civil). This is because the assessment within this chapter is desk-based furthermore, sufficient information is available from the CAA and the Military Aviation Authority (MAA) guidance, regulation and publications and through the completion of direct aviation stakeholder engagement.

15.7 Baseline environment

15.7.1 Overview of baseline environment

15.7.1.1 The following sections provide a summary of the aviation (military and civil) baseline environment. Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report and Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment include full details of the analysis undertaken to develop the aviation (military and civil) baseline.

Airspace

15.7.1.2 The airspace above and around the Morven South Boundary is used by both civil and military aircraft, which are tracked by radar systems operated by both NERL and the MOD. The Morven South Boundary will be located within the Scottish Flight Information Region (FIR) in an area of Class G uncontrolled airspace, which is established from surface up to Flight Level (FL) 195 (approximately 19,500 feet (ft)). Above this Class G[1] Airspace is Class C[2] Controlled Airspace (CAS). Aircraft operating within CAS must be in receipt of an Air Traffic Service (ATS) from NERL, military air traffic controllers located at a NERL Area Control Centre (ACC) or under the control of military air defence controllers; ATC instructions in CAS are, in the main, mandatory. The carriage of a serviceable and operating aircraft transponder is mandatory in UK airspace at and above FL 100.

Civil aviation

Airports

15.7.1.3 The only UK civil airport that has the potential to be impacted and is the nearest to the Morven South Boundary is Aberdeen Airport, which is located approximately 56nm northwest of the site on a bearing of 302° (measured to the Airfield Reference Point (ARP). Airports with published IFPs have associated Minimum Sector Altitudes (MSA). A MSA defines the minimum safe altitude an aircraft can descend to within a sector of radius 25nm (approximately 46km). These sectors provide obstacle clearance protection of at least 1,000ft to aircraft within that area. This allows pilots of aircraft flying under Instrument Flight Rules[3] (IFR) the reassurance of properly designated obstacle and terrain clearance protection while making an approach and landing at an airport in poor weather. Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment includes full details of the IFP analysis undertaken to develop the aviation baseline. This concluded that the Morven South Boundary will not impact safeguarded areas and IFP that serve the airport.

[1] Class G airspace is uncontrolled; pilots may enter the airspace subject to a set of simple rules. Pilots are not obliged to contact air traffic control agencies, but many do for other traffic information, pilots remain responsible for their own safety and the avoidance of terrain, other aircraft and obstacles.

[2] Class C airspace is controlled airspace in which instructions provided to pilots are mandatory. Subject to the flight conditions and type of flight, aircrafts are separated from each other within this class of airspace.

[3] Instrument Flight Rules (IFR) are rules which allow properly equipped aircraft to be flown under Instrument Meteorological Conditions (IMC).

Aviation radar

15.7.1.4 Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report provides the results of the radar Line of Sight (LoS) analysis. The accurate maximum tip height is confirmed to be 363m Lowest Astronomical Tide (LAT); however, as this equates to a value less than 363m AMSL, and as elevations in aviation are referenced to sea level, the value of 363m AMSL was used for assessment.

15.7.1.5 The majority of the Morven South operational wind turbines at the maximum blade tip height are theoretically highly likely to be detectable by the NERL Perwinnes PSR, intermittent theoretical detection of the most southeasterly part of the Morven South Boundary cannot be ruled out. The NERL Allanshill PSR theoretically will not detect the operational wind turbines at the maximum blade tip height. The NERL response provided in the Morven Site Scoping Opinion (MD-LOT, 2023) provides an objection to the proposal based on predicted radar detection by the Perwinnes and Allanshill PSRs on the aggregated Morven North and Morven South sites. Air traffic controllers at Aberdeen Airport also utilise data from the NERL Perwinnes and Allanshill PSR systems for the control of aircraft operating to/from the airport and for support to helicopters operating offshore.

Offshore helicopter operations

Airborne Search and Rescue

15.7.1.6 The main activity completed by commercial offshore helicopter operations in the airspace surrounding the Morven South Boundary encompass Search and Rescue (SAR) operations and support to offshore oil and gas exploitation. Bristow Helicopters Ltd hold the UK Government national contract to deliver helicopter SAR operations on behalf of the MCA. SAR are not constrained by Commercial Air Transport (CAT) regulations as these flights are generally flown by His Majesty's Coastguard (HMCG) SAR aircraft operating under CAP 999 (CAA, 2023b). The Coastguard helicopters are operated as state aircraft under national regulations and are not constrained by the higher weather limits usually provided to CAT operation (CAA, 2023b). The closest SAR helicopter base to Morven South is Inverness Airport approximately 117nm northwest of the Morven South Boundary. As well as providing offshore helicopter transportation, Offshore Helicopter Services (formally Babcock) operate two helicopters in the SAR role from Aberdeen Airport, 24 hours per day. The Applicant will take into consideration potential impact to local SAR operations when assessing the impact on navigational safety and emergency response caused by offshore renewable energy installation developments. Development of, and adherence to, a design plan which will be prepared in accordance with the layout principles provided in MGN 654 and agreed with MD-LOT in consultation with the MCA and the Northern Lighthouse Board (NLB) as appropriate. Volume 2, Chapter 13 Shipping and Navigation Chapter of the EIA describes the process of the development of the design plan.

Support to oil and gas exploitation

15.7.1.7 Helicopters supporting offshore oil and gas, in the northern North Sea, use HMRI radiating from Aberdeen Airport (the main support base) on a hub/spoke radial pattern (see Figure 15.2). These HMRIs lie to the north of the Morven South Boundary; the closest being 16nm to the north of the northeastern boundary of the Morven South Boundary on a bearing of 020°. The CAA recommend within CAP 764 (CAA, 2016) that there should be no obstacles within 2nm either side of the centreline of a HMRI; the Morven South Boundary is located outside of the CAA recommended obstacle free distance.

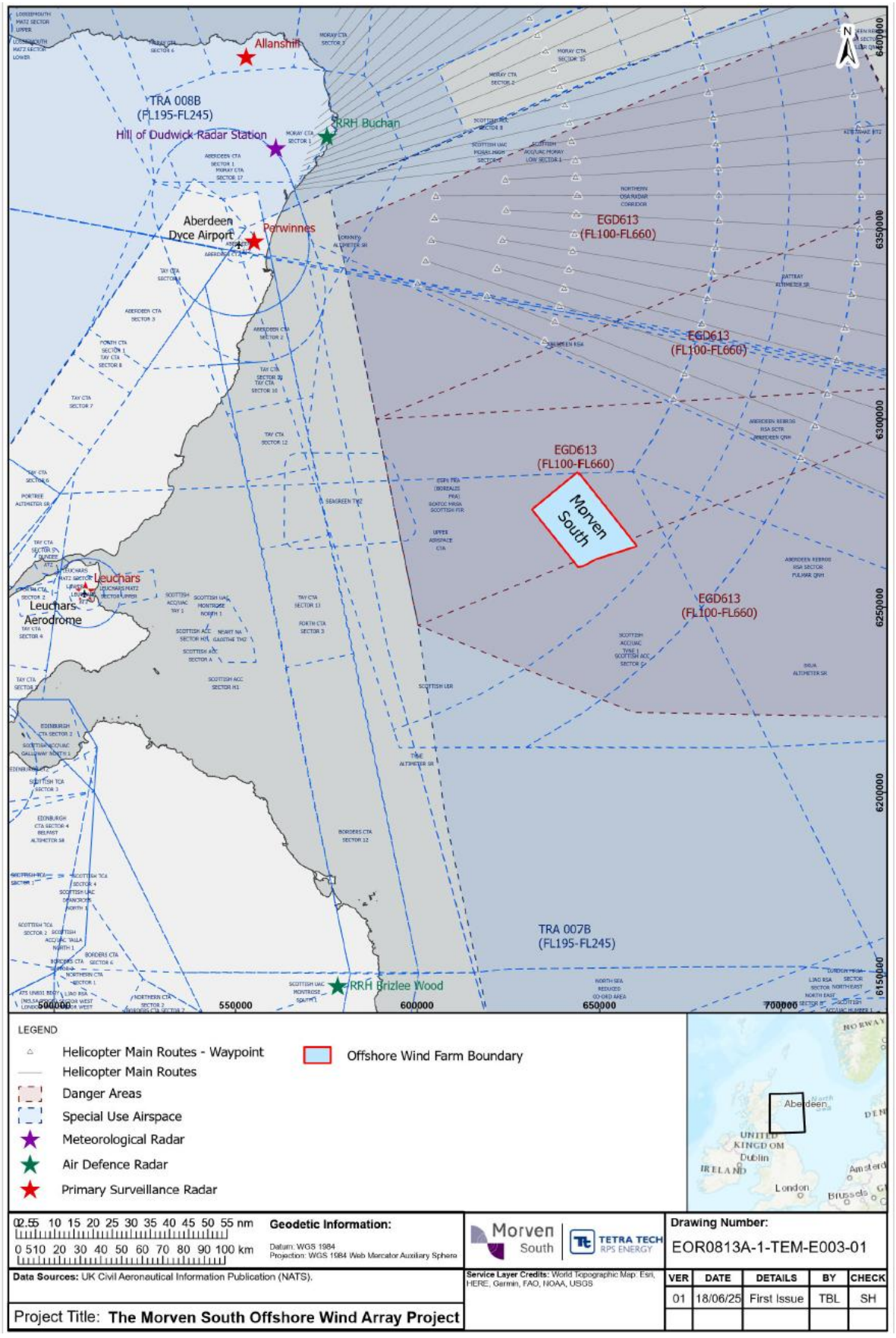

Figure 15.2: Aviation (Military and Civil) Airspace Construct Surrounding Morven South

Military Aviation

Air Defence Radar

15.7.1.8 The MOD operate a number of ADR specifically along the UK east coast from Norfolk to Aberdeenshire. ADR systems are similarly impacted by the detection of operational wind turbines as PSR systems. These generalised effects are provided in Section 4.3.2 of Volume 3, Annex15.1: Aviation (Military and Civil) Shared Technical Report. Due to their role in the defence of UK airspace; any identified impact of wind turbines on the MOD ADR systems that serve the airspace above the Morven South Boundary may potentially reduce the capability of the MOD to detect potentially hostile aerial activity.

15.7.1.9 The nearest ADR to Morven South is the TPS-77 (Type 92) ADR located at RRH Buchan, Aberdeenshire, which is located approximately 59nm northwest of the site on a bearing of 323° from the closest boundary of the Morven South Boundary. Radar LoS analysis predicts that the operation of the Buchan ADR may be affected by the detection of operational wind turbines at the maximum blade tip height when placed within the northern part of the Morven South Boundary. Theoretical radar detectability diminishes with increased range from the location of the Buchan ADR location (see Volume 3, Annex 15.1: The Aviation (Military and Civil) Shared Technical Report). The scoping response from the MOD confirmed that RRH Buchan should be scoped into the EIA assessment.

15.7.1.10 RRH Brizlee Wood in Northumberland operates a TPS 77 type ADR and is located approximately 68nm southwest of the site on a bearing of 209° from the Morven South Boundary. At the maximum blade tip height, the Brizlee Wood ADR will theoretically detect operational wind turbines placed within the majority of the Morven South Boundary (see Volume 3, Annex15.1: The Aviation (Military and Civil) Shared Technical Report. Due to being theoretically detectable within the Morven South Boundary, RRH Brizlee Wood has been scoped into the EIA assessment on a precautionary basis, although the scoping response from the MOD did not state that this was required.

Airfields

15.7.1.11 Leuchars Station is operated by the British Army; however, a number of Royal Air Force (RAF) training aircraft based at the airfield are supported by RAF ATC which are located at the station. The Leuchars Airfield PSR is located on the Leuchars Station airfield approximately 71nm west of the Morven South Boundary on a bearing of 267°. Although there is potential for the Leuchars ATC PSR to detect the maximum height of operational wind turbines placed within the Morven South Boundary, it is not envisaged that Leuchars air traffic controllers will be providing a radar ATS in the vicinity of the Morven South Boundary. The Morven South Boundary will be located outside of Leuchars AoR which is expected to extend to 40nm radius from the Leuchars Station PSR position. The scoping response from the MOD agreed that the Leuchars PSR should be scoped out of EIA assessment. Potential impact to Leuchars Station is scoped out of the EIA.

Military Low Flying

15.7.1.12 Military low flying activities take place in uncontrolled airspace below 2,000ft AMSL within defined Low Flying Areas (LFA). The Morven South Boundary is adjacent to LFA 14; however, low flying activity also extends offshore therefore, military low flying is likely to take place above and around the Morven South Boundary. The MOD Defence Infrastructure Organisation (DIO) (who safeguard MOD infrastructure) commonly request aviation obstruction lighting to be fitted to wind turbines in accordance with CAP 393 (CAA 2016, as amended 2022b). The fitment of aviation obstruction lighting will be detailed within Volume 4, Chapter 4: Outline Lighting and Marking Plan in line with CAP 764 (CAA, 2016), which will be produced and consulted on post-consent.

Practice and Exercise Areas

15.7.1.13 UK En-Route Low Altitude North Sea West Offshore Installations (UK (L) 5 OIL) (MOD, 2025a) chart provides the location of military PEXA. The Morven South Boundary does not lie within the vertical dimensions of any military aeronautical PEXA; however, it does lie beneath a block of airspace utilised for air combat training known as D613, a managed high intensity manoeuvring area (Figure

15.2). The MOD Scoping response provided confirmation that no impact is expected to military PEXA, therefore, PEXA has been scoped out from further assessment.

Meteorological radar

15.7.1.14 The Met Office safeguards its weather radar and provides site specific (radar) pre-planning advice for proposals sited in Met Office consultation zones; these zones extend to a 20km radius of Met Office radar sites (OPERA, 2009). The Morven South Boundary is located outside of the consultation zone, at approximately 116km from the nearest Met Office radar at Hill of Dudwick, Aberdeenshire. The Met Office have confirmed in response to engagement that the Morven South Boundary will not impact Met Office radar operations; therefore, Met Office radar is not considered further in the Morven South EIA Report.

15.7.2 Future baseline scenario

15.7.2.1 The EIA Regulations require the following to be included within the EIA Report: "a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without development as far as natural changes from the baseline scenario can be assessed with reasonable effort, on the basis of the availability of environmental information and scientific knowledge."

15.7.2.2 In the event that Morven South does not come forward, an assessment of the future baseline conditions has been carried out and is described within this section.

15.7.2.3 The North Sea Transition Authority (NSTA) Oil and Gas Authority (OGA) Annual Report and Accounts 2023-2024 (NSTA, 2024) reported a predicted decline in North Sea production of hydrocarbons and usage in following years. The Department for Energy Security and Net Zero (DESNZ) consulted on plan to unleash the North Sea's clean energy future and ensure prosperous and sustainable transition for oil and gas. Results of the consultation are awaited. While the UK Government has pledged not to issue new licences for exploration, existing oil and gas fields will continue to be maintained for their lifespan. The North Sea is expected to continue producing a significant portion of the UK's oil and gas, but the focus is shifting towards renewable energy sources like wind, carbon capture, and hydrogen.

15.7.2.4 As old oil and gas fields are decommissioned it is considered that helicopter use to oil and gas platforms associated with these fields will eventually decline; however, as helicopter support to offshore wind increases it is expected that there may be increased aviation activity as new offshore areas are developed to support net zero targets. Based on the timings of the development of Morven South, the baseline environment for aviation (military and civil) is not expected to change. The present airspace construct or usage by military and civil aircraft above and around the Morven South Boundary is not expected to change significantly.

15.7.3 Data limitations and assumptions

15.7.3.1 The data used in this chapter is the most up to date publicly available information which can be obtained from the data sources as cited. Data have also been provided through engagement with the stakeholders detailed in Table 15.4. For the purposes of the military and civil aviation, it should be noted that the results of the radar LoS analysis (Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report) are theoretical and considered to be conservative. These results are provided in order to establish the reasonable worst-case possibility of impact to aviation radar stakeholders.

15.8 Methodology for assessment of effects

15.8.1 Overview

15.8.1.1 The aviation (military and civil) assessment of effects has followed the methodology set out in Volume 1, Chapter 4: EIA Methodology. Specific to the Aviation (Military and Civil) assessment of effects, the guidance documents in Table 15.3 have been considered.

15.8.1.2 In addition, the Aviation (Military and Civil) assessment of effects has considered the legislative framework as provided in Table 15.1 and Table 15.2.

15.8.2 Assessment criteria

15.8.2.1 The approach for determining the significance of effects is a two-stage process that involves defining the magnitude of the potential impacts and the sensitivity of the receptors. This section describes the criteria applied in this chapter to assign values to the magnitude of potential impacts and the sensitivity of the receptors. The terms used to define magnitude and sensitivity are based on those which are described in further detail in Volume 1, Chapter 4: EIA Methodology.

15.8.2.2 The criteria for defining magnitude in this chapter are outlined in Table 15.8 below.

Table 15.8: Definition of terms relating to the magnitude

Magnitude of impact	Definition
High	Total loss of ability to carry on activities and/or impact is of extended spatial extent and/or long-term duration (i.e. total life of project) and/or frequency of repetition is continuous and/or effect is not reversible for project phase.
Medium	Loss or alteration to significant portions of key components of current activity and/or spatial extent of impact is moderate and/or medium-term duration (i.e. operational period) and/or frequency of repetition is medium to continuous and/or effect is not reversible for project phase.
Low	Minor shift away from baseline, leading to a reduction in level of activity that may be undertaken and/or spatial extent of impact is low and/or short to medium term duration (i.e. construction period) and/or frequency of repetition is low to continuous and/or effect is not reversible for project phase.
Negligible	Very slight change from baseline condition and/or spatial extent of impact is negligible and/or short-term duration (i.e. less than two years) and/or frequency of repetition is negligible to continuous and/or effect is reversible.

15.8.2.3 The criteria for defining sensitivity in this chapter are outlined in Table 15.9 below.

Table 15.9: Definition of terms relating to the sensitivity of the receptor

Value (sensitivity of the receptor)	Description
Very High	Receptor or the activities of the receptor, is of critical importance to the local, regional or national economy and/or the receptor or the activities of the receptor, is highly vulnerable to impacts that may arise from Morven South and/or recoverability is long-term or not possible.
High	Receptor or the activities of the receptor, is of high value to the local, regional or national economy and/or the receptor or the activities of the receptor, is generally vulnerable to impacts that may arise from Morven South and/or recoverability is slow and/or costly.
Medium	Receptor or the activities of the receptor, is of moderate value to the local, regional or national economy and/or the receptor or the activities of the receptor, is somewhat vulnerable to impacts that may arise from Morven South and/or has moderate to high levels of recoverability.
Low	Receptor or the activities of the receptor, is of low value to the local, regional or national economy and/or the receptor or the activities of the receptor, is not generally vulnerable to impacts that may arise from Morven South and/or has high recoverability.
Negligible	Receptor provides a service which is of negligible value to the local, regional or national economy, and/or the receptor is not vulnerable to impacts that may arise from Morven South, and/or has high recoverability.

15.8.2.4 The significance of the effect upon Aviation (Military and Civil) is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 15.10.

15.8.2.5 For the purposes of this assessment:

- a level of effect of moderate or more will be considered a “significant” effect in terms of the EIA Regulations;
- a level of effect of minor or less will be considered “not significant” in terms of the EIA Regulations.

15.8.2.6 In cases where a range is suggested for the significance of effect, there remains the possibility that this may span the significance threshold (i.e. the range is given as minor to moderate). In such cases the final significance is based upon the expert's professional judgement as to which outcome delineates the most likely effect, with an explanation as to why this is the case.

15.8.2.7 Effects of moderate significance or above are therefore considered important in the decision-making process, while effects of minor significance or less warrant little, if any, weight in the decision-making process.

Table 15.10: Matrix used for the assessment of the significance of the effect

Sensitivity of receptor	Magnitude of impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible to minor	Negligible to minor	Minor
Low	Negligible to minor	Negligible to minor	Minor	Minor to moderate
Medium	Negligible to minor	Minor	Moderate	Moderate to major
High	Minor	Minor to moderate	Moderate to major	Major
Very high	Minor	Moderate to major	Major	Major

15.9 Parameters for assessment

15.9.1 Maximum Design Scenario

15.9.1.1 The Maximum Design Scenarios (MDSs) identified in Table 15.11 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in Volume 1, Chapter 4: Project Description.

15.9.1.2 The assessment of potential impacts on aviation (military and civil) is based on the MDS as identified from a Project Design Envelope (PDE) and is specific to the potential impacts identified in this chapter. The key parameters for the MDS include:

- consideration of the maximum number of wind turbines across the largest area and the maximum blade tip height of 363m above LAT;
- aviation radar systems that potentially detect the Morven South maximum (highest) wind turbine blade tip height of 363m (AMSL);
- an accurate maximum tip height is confirmed to be 363m Lowest Astronomical Tide (LAT); however, as this equates to a value less than 363m AMSL, and as elevations in aviation are referenced to sea level, the value of 363m AMSL is used for assessment.

15.9.1.3 The MDS for impacts on aviation (military and civil) assumes that the entirety of the Morven South Boundary will be populated with wind turbines (58) at the maximum blade tip height of 363m above LAT, and five OSP with a maximum height of 90m above LAT. This is because the largest area of the highest wind turbines will create the largest impact from a physical obstruction and radar interference perspective, leading to a potential greater effect on aviation services. Any aspects of the infrastructure that are lower in height than the wind turbines (i.e. the OSPs) and less than the extent of the Morven South Boundary will not create an incremental effect on aviation interests.

Table 15.11: Maximum Design Scenario considered for the assessment of potential impacts on aviation (military and civil)

C= construction, O= O&M, D= decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "✗" outlines there is no impact within this project phase

Potential impact	Phase			Maximum Design Scenario	Justification
	C	O	D		
Creation of a physical obstacle to aircraft operations	✓	✓	✓	Construction phase During the construction phase the potential creation of physical obstacles to aircraft operations will be gradual as the presence of infrastructure increases to reach the MDS outlined below in the O&M phase. The MDS in terms of the presence of infrastructure would be on the completion of the construction phase. O&M phase • Up to 58 wind turbines at a maximum blade tip height of 363m above LAT. • Up to 5 OSPs with a maximum height, inclusive of antenna structure of 90m above LAT. Decommissioning phase During the decommissioning phase creation of physical obstacles to aircraft operations would gradually decrease from the operational MDS as wind turbines and OSPs topsides are removed from above the level of the sea surface.	Maximum physical obstruction to aviation operations due to size and number of wind turbines and OSPs above LAT
Wind turbines causing interference to aviation radar systems	✗	✓	✗	O&M phase • Radar detection of up to 58 wind turbines at a maximum blade tip height of 363m above LAT.	ATC may be unable to provide an effective surveillance service due to interference on PSR systems. Similar to the use of civil ATC systems, the MOD operates ADR for the provision of air defence of UK airspace and Air Traffic Control services. Radar detection of operational wind turbines may reduce the capability of the air defence force utilising the RRH Buchan and RRH Brizlee Wood radar systems.

15.10 Designed-in measures and mitigation

15.10.1.1 As part of Morven South design process, a number of measures (primary and tertiary) have been adopted to reduce the potential for impacts on Aviation (Military and Civil) (see Table 15.12). For the purposes of the EIA process, the term 'designed-in measure' is used to include the following measures (adapted from IEMA, 2024):

- Measures included as part of the design of Morven South. These include modifications to the location or design of Morven South, which are integrated into the application for consent. These measures are considered standard industry practice for this type of development and are referred to as primary mitigation in IEMA, (2024).
- Measures required to meet legislative requirements, or actions that are generally standard practice used to manage commonly occurring environmental effects. These measures are secured through the conditions of the marine licences and referred to as tertiary mitigation in IEMA, (2024).

15.10.1.2 As there is a commitment to implementing these measures, they are considered inherently part of the design of Morven South and have therefore been considered in the assessment presented in Section 15.11 (i.e. the determination of magnitude and therefore significance assumes implementation of these measures).

15.10.1.3 The requirement for any additional mitigation measures is dependent on the significance of the effects on aviation (military and civil). Where significant effects have been identified, further mitigation measures (referred to as secondary mitigation in IEMA, 2024)) have been identified to reduce the significance of effect to acceptable levels following the initial assessment. These are measures that could further prevent, reduce and, where possible, offset any adverse effects on the environment. These measures are set out, where relevant, in Section 15.11.

15.10.1.4 All designed-in measures and mitigation are detailed in Volume 3, Chapter 5: Morven South EIA Commitments Register.

Table 15.12: Designed-in (primary and tertiary) measures adopted as part of Morven South

Reference number	Designed-in measures adopted as part of Morven South	Justification	Primary or tertiary
MM-9	Notification to NOTAM (Notification to Aviation) will be made in the event of any failure of aviation lighting.	To mitigate the creation of obstruction(s) to the low flying airspace during construction, and to reduce the risk of temporary hazards. Appropriate marking, lighting and aids to navigation will be employed during the construction, operations and maintenance and decommissioning phases as appropriate to ensure the safety of all parties. Appropriate lighting will ensure the offshore structures are visible for search and rescue and emergency response procedures and other airspace users. The location of all infrastructure (including wind turbines, OSPs) can be incorporated into a Notice to Aviation (NOTAM). The NOTAM will be updated in the event of any failure of aviation lighting.	Tertiary

Reference number	Designed-in measures adopted as part of Morven South	Justification	Primary or tertiary
MM-10	Notification to the DIO of relevant construction works including temporary hazards.	To maximise awareness of obstructions and/or temporary hazards, the DIO will be provided with information in advance of construction. Information to include; start and end dates, the maximum height of construction equipment and locations of offshore substation platforms.	Tertiary
MM-34	Development of and adherence to a Lighting and Marking Plan (LMP).	The LMP will detail compliance with legal requirements as required and/or determined necessary for aviation safety as agreed by the CAA and the DIO for the operational life of the Project. The Array will be designed and constructed in accordance with relevant guidance: • Provision and Maintenance of Local Aids to Navigation Marking of Offshore Renewable Energy Installations (Trinity House *n.d*). • Offshore Renewable Energy Installations: Requirements, Guidance and Operational Considerations for Search and Rescue and Emergency Response (MCA, 2024).	Primary
MM-36	Prior to the start of construction, the Ministry of Defence Aeronautical Information Documents Unit (AIDU) and UK Hydrographic Office will be provided with the information required for inclusion on aviation charts.	Prior to the start of construction, the Ministry of Defence AIDU and UK Hydrographic Office will be provided with the information required for inclusion on aviation charts. Appropriate information about the site construction and any associated lighting (where applicable), for example the height and temporary location of construction cranes, would then be provided to the NATS Aeronautical Information Service (AIS) (for promulgation in applicable aviation publications, including the UK Integrated Aeronautical Information Package (IAIP)). This is in line with standard industry practice to allow inclusion on aviation charts.	Tertiary

15.11 Assessment of significant effects

15.11.1.1 The potential impacts arising from the construction and O&M and decommissioning phases of Morven South are listed in Table 15.11, along with the MDS against which each impact has been assessed.

15.11.1.2 An assessment of the likely significance of the effects of the Morven South Boundary on aviation (military and civil) receptors caused by each identified impact is given below.

15.11.2 Creation of a physical obstruction to aircraft operations

15.11.2.1 The construction, O&M, and decommissioning phases of Morven South will lead to the creation of a physical obstacle to aircraft operations. The MDS in regard to aviation, is represented by up to 58

wind turbines with a maximum blade tip height of 363m above LAT and is summarised in Table 15.11.

Construction phase

Magnitude of impact

15.11.2.2 Wind turbine construction infrastructure above LAT could pose a physical obstruction to flight operations specifically to military and other low flying operations including fisheries protection, pollution control and helicopters operating offshore in support of the renewable industries. ATC service providers have been consulted with regard to the potential for Morven South to create an obstruction to aviation operations conducted in the vicinity of the Morven South Boundary. Construction infrastructure, OSPs and erected wind turbines can be difficult to see from the air, particularly in poor meteorological conditions leading to potential increased obstacle collision risk. Furthermore, during the construction phase presence and movement of associated infrastructure may present a potential obstacle collision risk to aircraft flight operations.

15.11.2.3 Volume 3, Annex 15.2: Aviation (Military and Civil) Shared IFP Assessment includes full details of the IFP analysis undertaken to develop the aviation (military and civil) baseline and assesses Aberdeen Airport IFPs which have the potential to be impacted by the creation of physical obstacles created by the development of Morven South. The IFP assessment was completed at a maximum blade tip height of 363m AMSL and has concluded that Morven South will not breach the MSA or IFPs of Aberdeen Airport. These areas provide an altitude at which a minimum of 1,000ft above the highest obstacle is required for IFR flights. The accurate maximum tip height is confirmed to be 363m LAT; however, as this equates to a value less than 363m AMSL, and as elevations in aviation are referenced to sea level, the value of 363m AMSL is used for assessment.

15.11.2.4 A range of designed-in measures, in the form of appropriate notification to military and civil stakeholders, regularity of layout, and lighting and marking to minimise effects to aviation flight operations would apply to Morven South. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders.

15.11.2.5 The impact is predicted to be of regional spatial extent, short-term duration during the construction phase, continuous and low magnitude. It is predicted that the impact will affect the receptor directly.

Sensitivity of the receptor

15.11.2.6 Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter; however, during flight, weather conditions or operational requirements may necessitate route adjustments. In Visual Meteorological Conditions (VMC), pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and will be aware through notification procedures of Morven South. Furthermore, when flying in Instrument Meteorological Conditions (IMC), pilots may be under the control of ATC with an appropriate level of radar service being provided and flying at an altitude which provides the required separation from obstacles below them. Based on professional judgment, the military and other civil operations low flying receptors are deemed to be of high vulnerability due to the creation of an obstacle. The design in measures as provided in Table 15.12 will allow high recoverability. Low flying receptors are high value due to the low-level training requirement of military and some civil aircrews. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effect

15.11.2.7 Overall, for military and other receptors involved in offshore low flying operations, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

15.11.2.8 No mitigation measures for aviation (military and civil) are considered necessary because the likely effect in the absence of further mitigation (beyond the designed-in measures outlined in Table 15.12), is not significant in EIA terms.

Operations and maintenance phase

Magnitude of impact

15.11.2.9 During the operations and maintenance phase of Morven South, wind turbines and OSPs could pose a physical obstruction to the flight of aircraft operating in the vicinity, specifically to aircraft operating at low level. ATC service providers have been consulted with regard to the potential for Morven South to create an obstruction to aviation low flying activities conducted in the vicinity of the Morven South Boundary.

15.11.2.10 Those measures described in paragraphs 15.11.2.3 and 15.11.2.4 are equally applicable to the O&M phase of Morven South. However, with the designed-in measures outlined in Table 15.12, the magnitude is therefore considered to be low.

Sensitivity of the receptor

15.11.2.11 Based on professional judgement, the military and other civil operations low flying receptors are deemed to be of high vulnerability due to the creation of an obstacle, The design in measures as provided in Table 15.12 will allow high recoverability. Low flying receptors are high value due to the low-level training requirement of military and some civil aircrews. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effect

15.11.2.12 Overall, for military and other receptors involved in offshore low flying operations, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Secondary mitigation and residual effect

15.11.2.13 No mitigation measures for aviation (military and civil) are considered necessary because the likely effect in the absence of further mitigation (beyond the designed-in measures outlined in Table 15.12), is not significant in EIA terms.

Decommissioning phase

Magnitude of impact

15.11.2.14 During the decommissioning phase of Morven South, wind turbines, OSPs and decommissioning infrastructure will continue to pose a physical obstruction to the flight of aircraft operating in the vicinity, specifically to aircraft operating at low level. ATC service providers have been consulted with regard to the potential for Morven South to create an obstruction to aviation low flying activities conducted in the vicinity of the Morven South Boundary.

15.11.2.15 Those measures described in paragraphs 15.11.2.3 and 15.11.2.4 are equally applicable to the decommissioning phase of Morven South and will remain until Morven South infrastructure is removed from above the level of the sea. However, with the designed-in measures outlined in Table 15.12, the magnitude is therefore considered to be low.

Sensitivity of the receptor

15.11.2.16 Based on professional judgement, the military and other civil operations low flying receptors are deemed to be of high vulnerability due to the creation of an obstacle, The design in measures as

provided in Table 15.12 will allow high recoverability. Low flying receptors are high value due to the low-level training requirement of military and some civil aircrews. The sensitivity of the receptor is therefore, considered to be medium.

Significance of the effect

15.11.2.17 Overall, for military and other receptors involved in offshore low flying operations, the magnitude of the impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Secondary Mitigation and Residual Effect

15.11.2.18 No mitigation measures for aviation (military and civil) are considered necessary because the likely effect in the absence of further mitigation (beyond the designed-in measures outlined in Table 15.12), is **not significant** in EIA terms.

15.11.3 Wind turbines causing interference to aviation radar systems

Operations and maintenance phase

15.11.3.1 The operational wind turbines in the Morven South Boundary would be theoretically detectable by the NERL Perwinnes PSR system (also used by air traffic controllers at Aberdeen Airport to provide an ATS). Furthermore, operational wind turbines within the Morven South Boundary would also be theoretically detectable by the MOD RRH Buchan and Brizlee Wood ADRs.

15.11.3.2 Wind turbines detectable by a non-cooperative radar system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets. The generalised effects have on non-cooperative radar systems are provided in Volume 3 Annex 15.1: Aviation (Military and Civil) Shared Technical Report.

Magnitude of impact

15.11.3.3 Radar LoS modelling results are provided in Volume 3, Annex 15.1: Aviation (Military and Civil) Shared Technical Report. Results indicate that, due to the location of the Morven South Boundary and the maximum blade tip height of the wind turbines, theoretical radar detectability is likely to impact NERL, the MOD and Aberdeen Airport who utilise the affected radar systems for the control of aircraft.

15.11.3.4 The impact is predicted to be of regional spatial extent, long-term duration during the operation and maintenance phase, continuous and low reversibility. It is predicted that the impact will affect the receptors (NERL, the MOD and Aberdeen Airport) directly. The magnitude is therefore considered to be high.

Sensitivity of the receptor

15.11.3.5 The ability of NERL, the MOD and Aberdeen Airport to accurately use their respective radar systems for the provision of an ATS and in the case of the MOD, the detection of a potential airborne threat, could be impacted by the presence of wind turbine interference and the production of radar clutter on radar displays. Operators of aviation radar systems aim to ensure, where possible, “clutter free” radar to continue to deliver a safe and effective ATS and to securely monitor UK airspace.

15.11.3.6 NERL operations (and those undertaken at Aberdeen Airport), and the MOD are deemed to be of high vulnerability, medium recoverability, and high value. The sensitivity of the receptor is therefore, considered to be very high.

Significance of the effect

15.11.3.7 Overall, for military and other receptors which provide an ATS and surveillance of UK airspace from affected radar systems, the magnitude of the impact is deemed to be high, and the sensitivity of the receptors is considered to be very high. The effect will, therefore, be of **major adverse** significance, which is significant in EIA terms.

Secondary mitigation and residual effect

NERL

15.11.3.8 It is unlikely that all ATC providers (relevantly, NERL for civil en-route ATS, Aberdeen Airport and MOD's N° 78 Squadron for military en-route ATS) will be able to accommodate the PSR effects of the wind turbines on their ATS by operational adjustments alone and therefore some form of technical PSR mitigation solution will be required. The extent to which technical mitigation is required will reflect the ATS provided by the relevant stakeholders in the airspace surrounding Morven South.

15.11.3.9 Any technical mitigation solution decided upon will be subject to commercial agreement between the Applicant and the NATS Group. The NATS Group encompasses NERL and NATS (Services) Ltd (NSL). NERL is regulated by the CAA, while NSL provides ATC services at airports (reverently here Aberdeen Airport) and other related ATS including implementing windfarm mitigation on NERL systems. The NATS Group also provides surveillance and support infrastructure to the MOD's N° 78 Squadron under the Future Military Area Radar Service (FMARS) contract.

15.11.3.10 In the case of the NERL PSR systems at Perwinnes and Allanshill, NERL has previously accepted (particularly onshore) mitigation of wind turbine impacts by means of "radar blanking and infill". Radar blanking of the affected areas of the impacted PSR will remove all radar returns created by the detection of the wind turbines. However, all other radar returns in the blanked area will also be removed. To resolve this, radar data from another radar asset (predominately NERL's) which does not detect the wind turbines and has a base of cover which is acceptable to the affected ATS provider will "infill" the "blanked" areas ensuring "clutter free" radar coverage above the windfarm.

15.11.3.11 The Allanshill PSR is predicted to theoretically intermittently detect Morven South. NERL may be able to operationally manage any impact created to the Allanshill PSR. Subject to NERL agreement, the Perwinnes PSR may then be blanked and the Allanshill PSR may prove to be a viable option as an infill radar solution to mitigate the effect on the Perwinnes PSR and its concomitant ATS provision arising from Morven South.

15.11.3.12 Alternatively, technical mitigation could be implemented by radar blanking of the affected areas and imposition of a Transponder Mandatory Zone (TMZ) over Morven South. This "radar blanking and TMZ" mitigation has been extensively used to date to mitigate the impacts of wind turbines on NERL PSR offshore. As above, radar blanking will remove all PSR returns in the blanked areas, whether from wind turbines or from aircraft. Instead of an infill radar feed, an application is made to the CAA via an Airspace Change Proposal (ACP) for the establishment of a TMZ.

15.11.3.13 A TMZ is a defined volume of airspace in which the carriage and operation of a pressure-altitude transponder is mandatory for all aircraft (so ensuring that aircraft are detected by SSR systems). The creation of a TMZ allows the airspace within and above Morven South to retain its original classification while providing for enhanced situational awareness for all user stakeholders and for air traffic controllers. Tactical and operational provision can be made for non-compliant aircraft to gain access to the TMZ.

15.11.3.14 The Applicant has engaged with neighbouring offshore developments to initiate steps to procuring an ACP for a "regional TMZ". This approach to TMZ ACPs has been standard in the industry for some years, first being deployed 15 years ago for the London and Thanet Arrays and then for the

Greater Wash offshore windfarms. Each of the TMZ ACP participating offshore wind farms will separately need to agree their radar blanking contracts with the NATS Group.

15.11.3.15 Engagement with NERL and the wider NATS Group will continue to be progressed to agree a suitable mitigation for any detrimental impact occasioned to NERL's PSR systems.

15.11.3.16 The predicted impact to NERL PSR systems is one that industry has substantial experience of resolving and there is no known reason why suitable mitigation will not be agreed for Morven North. Overall, following application of secondary mitigation, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse** significance, which is **not significant** in EIA terms.

Ministry of Defence

15.11.3.17 In the case of the predicted impact to RRH Buchan and RRH Brizlee Wood ADR systems, direction as to mitigation has been provided in the jointly signed Strategy and Implementation Plan, Issue 1 (DESNZ, 2021) which sets the direction for collaboration between Government Departments and the offshore wind industry through the Offshore Wind Industry Council (OWIC) in pursuit of identifying, assessing and deploying solutions that will enable the co-existence of ADR based operations and offshore wind. The output of the MOD's ADR mitigation procurement programme, (known as Programme NJORD), is to deliver an enduring technical mitigation(s) across the UK.

15.11.3.18 The Clean Power 2030 Action Plan and the April 2025 consultation on the revised NPS EN-1 both make clear that enduring ADR mitigation is an essential requirement for achieving Government renewable energy deployment targets for 2030 and beyond. The full costs of the enduring ADR mitigation solutions identified by MOD's Programme NJORD are being funded through a Government-delivered route. The funding requirement is therefore removed from offshore wind developers. This alternative funding route will support delivery of the Clean Power 2030 Mission by helping to accelerate the deployment of offshore wind, whilst delivering maximum value for money to the energy billpayer. This funding applies to the known pipeline of offshore wind projects as of August 2024, at the following four air defence radar sites: Buchan, Brizlee Wood, Neatishead and Staxton Wold. Funding for radar mitigations for the remaining ADR will be considered as required going forward.

15.11.3.19 The Applicant through OWIC is funding the Programme NJORD workstream. The Applicant understands the new radars will be installed from 2029[4] with the deployment of the enduring ADR mitigation available for at the two ADR impacted by Morven South by the commencement of construction of Morven South The Applicant is aware that MOD practice in seeking to impose ADR mitigation conditions on offshore developments requires the ADR mitigation to be agreed and approved by the Scottish Ministers prior to first turbine rotation. Given the progress of Programme NJORD and the Government's commitment to funding the rollout of ADR mitigation, the Applicant is confident that a mutually agreeable ADR mitigation solution will be agreed with the MOD.

15.11.3.20 Following mitigation, the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high. The effect will, therefore, be of **minor adverse significance**, which is **not significant** in EIA terms.

15.11.4 Proposed monitoring

15.11.4.1 No aviation (military and civil) monitoring to test the predictions made within the assessment of potential effects on aviation (military and civil) is considered necessary as the secondary mitigation

[4] New radar systems to unlock offshore wind - GOV.UK

approved for use will only be authorised for use by the MOD and NERL if it is operationally effective and maintains the current level of aviation safety.

15.12 Whole project assessment and Cumulative Effects Assessment Methodology

15.12.1 Methodology

15.12.1.1 The whole project assessment and Cumulative Effects Assessment (CEA) have been undertaken in accordance with the methodology described in Volume 1, Chapter 4: EIA Methodology

15.12.1.2 The Morven Programme comprises four distinct projects: Morven North, Morven South, Morven Hawthorn Pit Grid Connection Project (MHPGC Project), and Morven Branxton Area Grid Connection Project (MBAGC Project).

15.12.1.3 The following assessment scenarios have been considered to identify the potential effects of Morven South in combination with other projects on the same receptor, as follows (and summarised in Table 15.13):

- Whole project assessment: to identify the potential impacts associated with Morven South together with each grid connection option in turn, (Scenario 1: MHPGC and Scenario 2: MBAGC Project), each of which would comprise a "Whole Project";
- Morven Programme assessment: to identify potential impacts associated with all four components of the Morven Programme together with other relevant projects, plans and activities (Scenario 3);
- CEA: to identify the potential impacts associated with Morven South, together with other relevant projects, plans and activities including other components of the Morven Programme, plans and activities using a tiered approach (Scenario 4).

Table 15.13: Scenarios considered in the Morven South whole project assessment and cumulative effects assessment for aviation (military and civil)

Whole project assessment		Morven Programme assessment (Offshore Ornithology and Shipping and Navigation chapters only)	Cumulative effects assessment
Scenario 1	**Scenario 2**	**Scenario 3**	**Scenario 4**
Morven North + MHPGC Project	Morven North + MBAGC Project	Morven North + Morven South + MHPGC Project + MBAGC Project	Morven North + Tier 1, Tier 2 and Tier 3 Plans/Projects screened in

15.12.1.4 For the purposes of this Aviation (Military and Civil) chapter, Scenario 4 has been taken forward for assessment; Scenarios 1, 2 and 3 have not been included as they are not applicable to this chapter.

15.12.1.5 For aviation (military and civil) impacts, the MHPGC Project and MBAGC Project have been screened out from the whole project and cumulative assessments for the following reasons:

- No conceptual pathway or physical effect-receptor overlap with Morven North.
- As the offshore cable is subsea, no impact to aviation related activity will occur.
- The near shore/onshore elements of the MBAGC Project and MHPGC Project are at a significant distance from the Morven North Boundary and will become part of the built environment considered by aircrews in their planning procedures for the avoidance of

obstacles. Stationary objects are removed from aviation radar displays by moving target indicator filtering.

15.12.1.6 The whole project assessment scenarios 1 and 2 are therefore not considered further within this chapter as the outcomes of these scenarios would not differ from the Morven North project alone assessment. Scenario 4 similarly also does not consider the MHPGC Project and MBAGC Project.

15.12.1.7 As discussed in Volume 1, Chapter 6: EIA Methodology, the Morven Programme assessment (Scenario 3) is only required for specific chapters to provide further context to, and to support, the conclusions of the CEA scenario (Scenario 4), in agreement with the relevant stakeholders for these topics. As Scenario 3 does not form the basis of the CEA conclusions, it is considered a supplementary assessment to the CEA scenario (Scenario 4) for these specific topics. The approach to cumulative effects assessment presented in this Aviation (Military and Civil) chapter complies with the requirements under the EIA Regulations to assess the LSE[1] on the environment arising from a project cumulatively with other relevant plans, projects and activities, and no supplementary assessment of the Morven Programme (Scenario 3) is required or has been requested by relevant stakeholders with regard to Aviation (Military and Civil).

15.12.1.8 The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise (see Volume 3, Appendix 6.3: Cumulative Effects Screening). Each project or plan has been considered on a case-by-case basis for screening in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

15.12.1.9 It is likely that operational windfarms that are considered in the EIA are mitigated against effect to aviation radar systems however, this is unable to be confirmed for each operational project included in the CEA. Aviation stakeholders may be utilising a mitigation work-rounds including the use of SSR alone and rerouting of air traffic. If individual radar is not mitigated, an increased cumulative effect may act as a tipping point that requires a robust technical mitigation solution to be considered. In undertaking the CEA for Morven South, it should be noted that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside Morven South. Therefore, a tiered approach has been adopted, whereby all third-party projects and plans considered have been allocated into “tiers” reflecting their current stage within the planning and development process. This provides a framework for placing relative weight upon the potential for each project/plan included in the CEA to ultimately be realised, based upon Morven South/plan’s current stage of maturity and certainty in Morven South/plan’s parameters. The tiered approach utilised within the Morven South CEA employs the following tiers:

- Tier 1 assessment – Existing developments either built (operational) or under construction[5]; approved developments awaiting implementation; and permitted/submitted application(s) but not yet determined, plus Morven North.
- Tier 2 assessment – All plans/projects assessed under Tier 1, and plans/projects where a scoping report has been submitted and is in the public domain.
- Tier 3 assessment – All plans/projects assessed under Tier 1 and 2, plus plans/projects that are reasonably foreseeable (e.g. projects identified in development plans, projects in other

[5] Note that existing developments are included in Tier 1 CEA long list but are generally screened out of the CEA assessments, aside from the following exceptions: 1) Existing developments which were not present at the time of baseline characterisation, where a potential cumulative impact-receptor pathway has been identified.

2) Existing developments are screened into tier 1 assessments for specific topics where there is a large conceptual, temporal and spatial overlap between project impacts. In these instances, the potential for ongoing effects through cumulative impact-receptor pathways throughout project lifetime, across the development phases, means that they are considered within quantitative assessment for these topic CEAs (e.g. offshore ornithology assessments consider the cumulative effects of operational offshore wind farms).

plans and programmes, offshore renewable energy projects that have a Crown Estate Scotland Lease Option Agreement).

15.12.1.10 The specific projects and plans screened into the CEA for aviation (military and civil) are outlined in Table 15.14.

15.12.1.11 All impacts considered for the Morven South alone assessment have been taken forward to the whole project and CEA assessment.

15.12.1.12 Figure 15.3 below provides an illustration of those projects and plans screened into the aviation (military and civil) CEA.

Table 15.14: List of other projects and plans considered within the Cumulative Effects Assessment for aviation (military and civil)

Project/plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Morven South (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with Morven South(e.g. Project construction phase overlaps with Morven South construction phase)
Tier 1						
Aberdeen Offshore Wind Farm (OWF)	Operational	95	Aberdeen Offshore Wind farm consists of 11 turbines at a capacity of 96.8MW		2024-2043	No
Berwick Bank	Consented	34	Berwick Bank Offshore Wind Farm is consented for up to 307 turbines with a capacity of up to 4,100MW	2025-2032	2033-2065	No
Hywind (Buchan Deep Demo)	Operational	97	Buchan Deep Demo Offshore Wind Farm consists of up to 5 turbines at a capacity of 30MW		2024-2037	No
Inch Cape Offshore Wind Farm	Under Construction	70	Inch Cape Offshore Wind Farm is consented for up to 72 turbines at a capacity of 1,100MW	2025-2026	2027-onward	No

Project/plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Morven South (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with Morven South(e.g. Project construction phase overlaps with Morven South construction phase)
Kincardine Offshore Wind Farm	Operational	72	Kincardine Offshore Wind Farm consists of six turbines at a capacity of 50MW		2024-2046	No
Morven North Offshore Wind Array Project	Application submitted/ Awaiting decision	0	Morven North Offshore Wind Array Project is proposed for up to 96 turbines at a capacity of 1500MW	2033-2037	2038-2078	Yes
Muir Mhor Offshore Wind Farm	Application submitted/Awaiting decision	77	Muir Mhor Offshore Wind Farm is proposed for a capacity of 798MW	2030-2033	2034- onward	Yes
Neart Na Gaoithe Offshore Wind Farm	Operational	85	Neart na Gaoithe Offshore Wind Farm is consented for up to 54 turbines at a capacity of 450MW		2025-2049	No
Ossian	Application submitted/Awaiting decision	5	The Ossian Floating Wind project is proposed for up to 3,610MW capacity	2029-2038	2039- onward	Yes
Seagreen 1	Operational	35	Seagreen 1 Offshore Wind Farm		2024-2048	No

Project/plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Morven South (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with Morven South(e.g. Project construction phase overlaps with Morven South construction phase)
			consists of up to 114 wind turbines at a capacity of 1,075MW			
Seagreen 1A	Consented	52	Seagreen 1A Offshore Wind Farm is consented for up to 36 turbines with no maximum generating capacity	2030-2031	2032-2046	No
Tier 2						
Bellrock Offshore Wind Farm	Consenting/ Pre-construction	35	Bellrock Floating Offshore Wind Farm is proposed for up to 132 turbines at a capacity of 1,800MW	2027-2030	2031- onward	No
Bowdun	Consenting/ Pre-construction	44	Bowdun Offshore Wind Farm is proposed for up to 67 turbines at a capacity of 1,008MW	2029-2033	2034-2064	Yes
Tier 3						

Project/plan	Status [i.e. Application, Consented, Under Construction, Operational]	Distance from Morven South (km)	Description of project/plan	Estimated dates of construction (If applicable)	Estimated dates of operation (If applicable)	Overlap with Morven South(e.g. Project construction phase overlaps with Morven South construction phase)
INTOG: Flora Offshore Wind Farm	Consenting/ Pre-construction	94	INTOG site 4 is proposed for up to 50MW	No data available	No data available	No data available
INTOG: Cedar Offshore Wind Farm	Consenting/ Pre-construction	85	INTOG site 10 is proposed for up to 1,008MW	2028	2029- onward	No

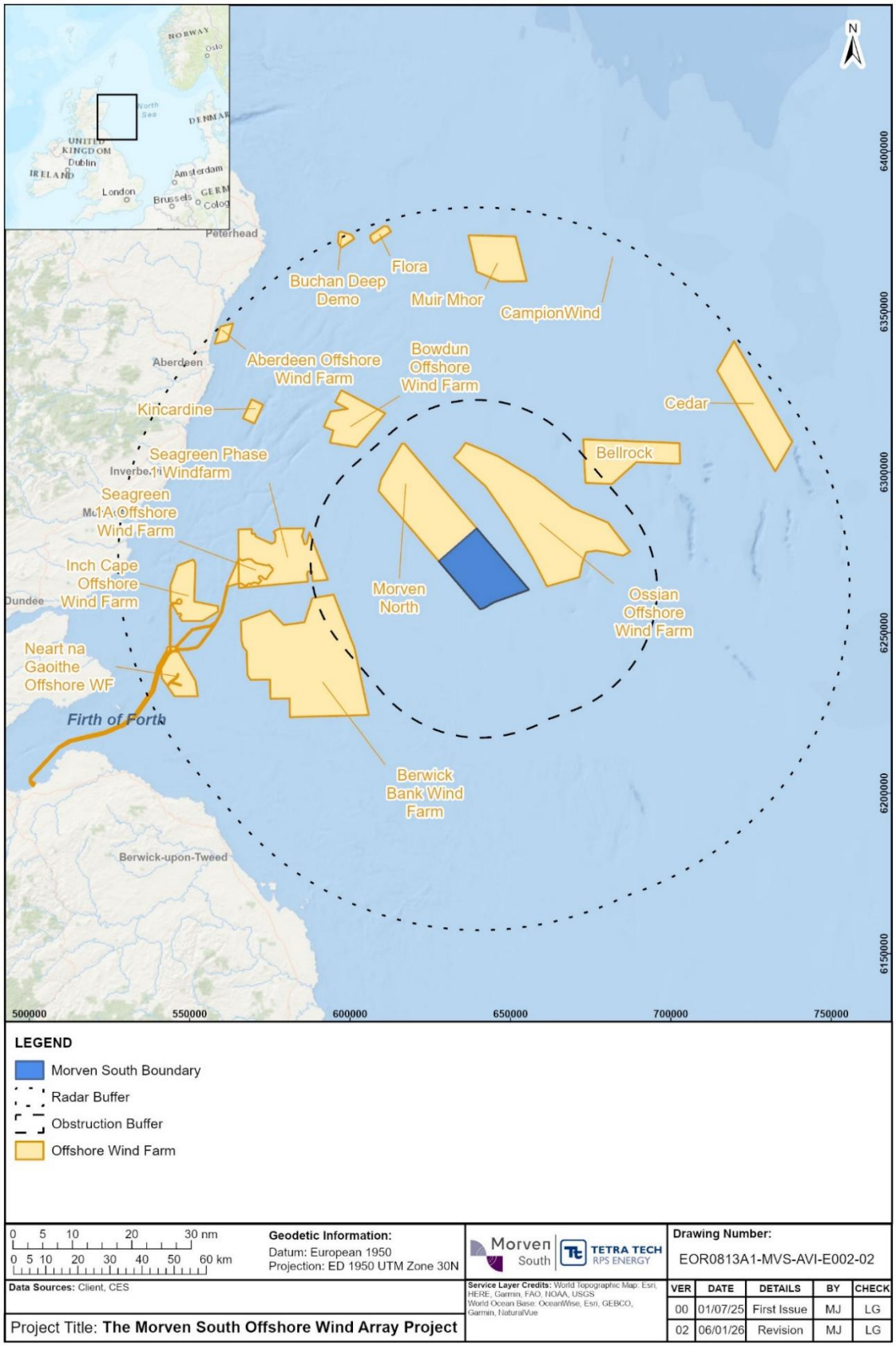

Figure 15.3: Other projects/plans and activities screened into the cumulative effects assessment for Aviation (Military and Civil)

15.12.2 Maximum Design Scenario

15.12.2.1 The cumulative MDSs identified in Table 15.15 have been selected as those having the potential to result in the greatest potential cumulative effect on an identified receptor or receptor group. The cumulative MDSs have been based on the Morven South alone assessment MDS (Table 15.11), as well as publicly available information on other third-party projects and plans that have been screened into the CEA (Table 15.14)

Table 15.15: Maximum design scenario considered for the assessment of potential whole project and cumulative effects on aviation (military and civil)

C= Construction, O= Operations and maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Potential Cumulative Effect	Phase			Maximum design scenario	Justification
	C	O	D		
Creation of a physical obstacle to aircraft operations	✓	✓	✓	Scenario 4 (excluding the MHPGC Project, and MBAGC Project). MDS as described for Morven South (Table 15.11) assessed cumulatively with the following other projects/plan within 40km of the Morven South Boundary; this includes the presence of other developments (projects, plans and activities) which will have the potential to create a cumulative aviation obstacle and affect the available airspace for other users in the same region within a 40km buffer of the Morven South Boundary. Tier 1: • Berwick Bank; • Morven North Offshore Wind Array Project; • Ossian; • Seagreen 1. Tier 2: • Bellrock Offshore Wind Farm. Tier 3: • No projects recognised.	This includes the presence of other offshore wind farm developments which will have the potential to create a cumulative aviation obstacle and affect the available airspace for other users in the same region within a representative 40 km buffer of the Morven South Boundary. Outcome of the CEA will be greatest when the greatest number of other schemes are considered.
Wind turbines causing interference to aviation radar systems	×	✓	×	Scenario 4 (excluding the MHPGC Project, and MBAGC Project). MDS as described for Morven South (Table 15.11) assessed cumulatively with the following other projects/plan within 100km of the Morven South Boundary; this includes the presence of other developments (projects, plans and activities) which will have the potential to create a cumulative aviation radar effect within a representative 100km buffer of the Morven South Boundary. Tier 1: • Aberdeen Offshore Wind Farm; • Berwick Bank;	Maximum aviation and radar cumulative effect is calculated within a representative 100 km buffer of the Morven South Boundary. ATC may be unable to provide an effective surveillance service due to interference on radar displays.

Potential Cumulative Effect	Phase			Maximum design scenario	Justification
	C	O	D		
				• European Offshore Wind Deployment Centre – Previously Aberdeen Demo • Hywind (Buchan Deep Demo); • Inch Cape Offshore Wind Farm; • Kincardine Offshore Wind Farm; • Morven North Offshore Wind Array Project; • Muir Mhor Offshore Wind Farm; • Neart Na Gaoithe; • Ossian; • Seagreen 1; • Seagreen 1A. Tier 2: • Bellrock Offshore Wind Farm; • Bowdun. Tier 3: • INTOG: Flora Offshore Wind Farm; • INTOG: Cedar Offshore Wind Farm.	

15.13 Whole project assessment and Cumulative Effects Assessment

15.13.1 Overview

15.13.1.1 A description of the significance of cumulative effects upon aviation (military and civil) receptors arising from each identified impact is given below. The CEA for the creation of a physical obstacle to aircraft operations is presented in Table 15.16.Table 15.7 provides the CEA for wind turbines causing interference to aviation radar systems.

Creation of a physical obstacle to aircraft operations

15.13.1.2 There is potential for the creation of a physical obstruction to aircraft low flying operations as a result of the Morven South construction, O&M and decommissioning activities alongside other offshore wind farms within the cumulative aviation (military and civil) study area. The activities include the use of construction infrastructure including cranes and the erection of wind turbines and OSPs.

15.13.1.3 A range of designed-in measures, in the form of appropriate notification to aviation stakeholders, regularity of layout and lighting and marking to minimise effects to aviation flight operations would apply to Morven South. These will comply with current guidelines where appropriate and be agreed with the appropriate stakeholders. Pilots are ultimately responsible for the avoidance of obstructions, terrain and other aircraft.

15.13.1.4 Cumulative physical obstruction impact has been assessed within 40km from the Morven South Boundary, which is considered to be the maximum range where the creation of an aviation obstacle to fixed wing and rotary aircraft operating offshore may occur although some impacts are likely to be localised to the Morven South Boundary.

Wind turbines causing interference to aviation radar systems

15.13.1.5 The Morven South operational wind turbines and a number of the Tier 1, 2 and 3 projects and plans in Table 15.15 could be theoretically detectable to some degree by the Perwinnes PSR system (also used by air traffic controllers at Aberdeen International Airport to provide an ATS) and the Buchan and Brizlee Wood ADR systems.

15.13.1.6 Wind turbines detectable by a non-cooperative radar system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.

15.13.1.7 Cumulative impact to aviation radar has been assessed within 100km from the Morven South Boundary, which is considered to be the maximum range where radar cumulative effects may occur. Without mitigation some impacts are likely to be localised to the Morven South Boundary due to the unmitigated effect created by the detection of operational wind turbines.

15.13.1.8 It is likely that those consented and operational wind farms included in the CEA are already mitigated against the effect to aviation radar through non-objection or agreements with NERL and/or the MOD leading to a withdrawal of objection. Unmitigated, the potential cumulative effect created by the detection of operational Morven South wind turbines will be to potentially add to radar screen clutter that presently may be operationally managed by the aviation stakeholder, potentially leading to an increase in the individual signal processing demands of the predicted affected aviation radar systems.

15.13.1.9 The summary of the CEA for aviation (military and civil) is presented in Table 15.16 and Table 15:17.

Table 15.16: Morven South Cumulative Effects Assessment for the creation of a physical obstacle to aircraft operations

	Cumulative effects assessment
	Scenario 4: Morven South and Tier 1, Tier 2 and Tier 3 Projects
Construction phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers Morven South together with the Tier 1, Tier 2 and Tier 3 projects below. Tier 1 includes: • Morven North; • Berwick Bank; • Ossian; • Seagreen 1. Aviation operations in the UK are highly regulated. Morven South will be located in airspace where the provision of an ATS is routine. The same rules of the air which maintain a safe operating environment in the current baseline will apply in the northern North Sea off the coast of Aberdeenshire during all phases of the construction of Morven South; the provision of an ATS will not be affected. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. Tier 2 includes the Bellrock Offshore Wind Farm. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low. Tier 3 No projects recognised
Sensitivity of receptor	Tier 1 includes: • Morven North • Berwick Bank; • Ossian; • Seagreen 1. At times of sufficient visibility, VMC pilots are ultimately responsible for seeing and avoiding obstructions such as wind turbines and other infrastructure and will be aware through notification procedures of Morven South. When flying in low visibility pilots will be

	Cumulative effects assessment
	Scenario 4: Morven South and Tier 1, Tier 2 and Tier 3 Projects
	operating above the MSA IFR and utilising on board systems which detects obstructions and be under the control of ATC with an appropriate level of radar service. The low level flight operator is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium. Tier 2 includes the Bellrock Offshore Wind Farm. The low level flight operator is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium. Tier 3 No projects recognised.
Significance of effect	Tier 1 includes: • Morven North; • Berwick Bank; • Ossian; • Seagreen 1. Overall, the magnitude of the cumulative impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. Tier 2 includes the Bellrock Offshore Wind Farm. Overall, the magnitude of the cumulative impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms. Tier 3 No projects recognised.
Operations and maintenance phase	
Magnitude of impact	Those tiered projects considered in the construction phase are the same for consideration in the O&M phase. Morven South will adopt those designed-in (primary and tertiary) measures as listed in Table 15.12 which will ensure required notification, charting and lighting and marking of Morven South. Pilots are obliged to plan their flying activities in advance and to be familiar with any en-route obstacles they may encounter. Those adjacent offshore wind farms, including Morven North, will incorporate

	Cumulative effects assessment
	Scenario 4: Morven South and Tier 1, Tier 2 and Tier 3 Projects
	similar notification, marking and lighting to respective projects. The rules of the air will apply through all phases of development with pilots responsible for avoiding obstructions, terrain and other aircraft. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	Low level flight operators' ability to continue using the northern North Sea airspace is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.
Decommissioning phase	
Magnitude of impact	During the decommissioning phase of Morven South, wind turbines, OSPs and infrastructure used in the decommissioning process will continue to pose a physical obstruction to the flight of aircraft operating in the vicinity, specifically to aircraft operating at low level. Those designed-in measures will remain current until infrastructure is removed from above sea level. Those tiered projects considered in the construction phase are the same for consideration in the decommissioning phase. The cumulative effect is predicted to be of regional spatial extent, short-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptor directly. The magnitude is therefore, considered to be low.
Sensitivity of receptor	Low level flight operators' ability to continue using the northern North Sea airspace during decommissioning is deemed to be of high vulnerability, high recoverability and high value. The sensitivity of the receptor is therefore, considered to be medium.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be low, and the sensitivity of the receptor is considered to be medium. The cumulative effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Table 15.17: Morven South Cumulative Effects Assessment for wind turbines causing interference to aviation radar systems

	Cumulative effects assessment
	Scenario 4: Morven South and Tier 1, Tier 2 and Tier 3 Projects
Operations and maintenance phase	
Magnitude of impact	The cumulative effects assessment for Scenario 4 considers Morven South together with the Tier 1, Tier 2 and Tier 3 projects below. Tier 1 includes • Morven North; • Aberdeen Offshore Wind Farm; • Berwick Bank; • European Offshore Wind Deployment Centre – previously Aberdeen Demo; • Hywind (Buchan Deep Demo); • Inch Cape Offshore Wind Farm; • Kincardine Offshore Wind Farm; • Muir Mhor Offshore Wind Farm; • Neart Na Gaoithe; • Ossian; • Seagreen 1; • Seagreen 1A. Wind turbines detectable by a non-cooperative radar system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets. The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is therefore, considered to be high. Tier 2 includes • Bellrock Offshore Wind Farm; • Bowdun; The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is therefore, considered to be high.

	Cumulative effects assessment
	Scenario 4: Morven South and Tier 1, Tier 2 and Tier 3 Projects
	Tier 3 includes • INTOG: Flora Offshore Wind Farm; • INTOG: Cedar Offshore Wind Farm; The cumulative effect is predicted to be of regional spatial extent, long-term duration, continuous and low reversibility. It is predicted that the impact will affect the receptors directly. The magnitude is therefore, considered to be high.
Sensitivity of receptor	Radar operators are deemed to be of high vulnerability, medium recoverability and high value. The sensitivity of the receptor is therefore, considered to be very high.
Significance of effect	Overall, the magnitude of the cumulative impact is deemed to be high, and the sensitivity of the receptor is considered to be very high. The cumulative effect will, therefore, be of **major adverse** significance, which is significant in EIA terms.
Further mitigation and residual significance	Overall, following secondary mitigation as described in paragraph 15.11.3.1 to 15.11.3.16 the magnitude of the impact is deemed to be negligible, and the sensitivity of the receptor is considered to be high. The residual effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

15.13.2 Proposed monitoring

15.13.2.1 No monitoring as a result of the CEA is proposed as mitigation will have been required for those receptors which are affected by operational and planned projects, a reduced obstacle baseline and radar (if any in some areas of the region) cumulative effect will be apparent and therefore with mitigation in place the residual effect will be minor which is not significant in EIA terms for all scenarios. No monitoring is therefore considered necessary.

15.14 Transboundary effects

15.14.1.1 A screening of transboundary impacts has been carried out (see Volume 3, Appendix 4.3: Transboundary Screening). This has identified that no likely significant transboundary effects with regard to aviation (military and civil) would result from Morven South upon the interests of other European Economic Area (EEA) States.

15.15 Inter-related effects

15.15.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of Morven South on the same receptor. Inter-related effects are considered to be either:

- Lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of Morven South (construction, O&M and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three project stages (e.g. subsea noise effects from piling, operational turbines, vessels and decommissioning);
- Receptor-led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on aviation (military and civil), such as creation of a physical obstruction and wind turbine related interference to aviation radar systems, may interact to produce a different, or greater effect on this receptor than when the effects are considered in isolation. Receptor-led effects may be short-term, temporary or transient effects, or incorporate longer-term effects.

15.15.1.2 A description of the likely inter-related effects arising from Morven North on aviation (military and civil) is provided in Volume 2, Chapter 21: Ecosystem Effects.

15.15.1.3 For Aviation (Military and Civil), the following potential impacts have been considered within the inter-related assessment:

- creation of a physical obstacle to aircraft operations;
- wind turbines causing interference to aviation radar systems.

15.15.1.4 Table 15.18 lists the inter-related effects (project lifetime effects) that are predicted to arise during the construction, O&M and decommissioning of Morven South and the inter-related effects (receptor-led effects) that are predicted to arise for aviation receptors.

Table 15.18: Summary of potential inter-related effects on the environment for aviation (military and civil) from individual effects occurring across the construction, O&M and decommissioning phases of Morven South and from multiple effects interacting across all phases (receptor-led effects).

C= Construction, O= O&M, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Description of impact	Phase			Likely significant inter-related effect	Significance
	C	O	D		
Morven North lifetime effects					
Creation of a physical obstacle to aircraft operations	✓	✓	✓	There is potential for the creation of a physical obstruction to aircraft low flying operations as a result of the Morven North construction, O&M and decommissioning activities alongside other offshore wind farms within the cumulative aviation (military and civil) study area. The activities include the use of construction infrastructure including cranes and the erection of wind turbines and OSPs.	Across the lifetime of Morven North, the effects on aviation (military and civil) are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.
Wind turbines causing interference to aviation radar systems	×	✓	×	Wind turbines detectable by a non-cooperative radar system might degrade the system by creating false targets, reduce system sensitivity, create radar shadowing behind the wind turbines and saturate the radar receiver leading to clutter potentially concealing real aircraft targets.	Across the lifetime of Morven North, the effects on aviation, military and communications receptors are not anticipated to interact in such a way as to result in inter-related effects of greater significance than the assessments presented for each individual phase. As a result, the inter-related effects are of minor adverse significance which is not significant in EIA terms.
Receptor-led effects					
All effects on aviation (military and civil), such as creation of a physical obstruction and wind turbine related interference to aviation radar systems, may interact to produce a different, or greater effect on these receptors than when the effects are considered in isolation. Receptor-led effects may be short-term, temporary or transient effects, or incorporate longer-term effects. The individual project alone impacts were assigned residual significance of effect of no greater than minor adverse once mitigation is applied. It is therefore anticipated that the significance of combined effects on airspace and radar users will not be of any greater significance than the effects when assessed in isolation.					

15.15.1.5 The individual project alone impacts were assigned residual significance of effect of no greater than minor adverse once mitigation is applied. It is therefore anticipated that the significance of combined effects on airspace and radar users will not be of any greater significance than the effects when assessed in isolation.

15.16 Summary of impacts, mitigation, Likely Significant Effects and monitoring

15.16.1.1 Information on Aviation (Military and Civil) within the Morven South Aviation (Military and Civil) Study Area was collected through desktop review, radar LoS analysis, IFP assessment and consultation response.

15.16.1.2 Table 15.19 presents a summary of the potential impacts, mitigation measures and the conclusion of likely significant effects on aviation (military and civil) in EIA terms. The impacts assessed include:

- creation of physical obstacle to aircraft operations;
- wind turbines causing interference to aviation radar.

15.16.1.3 Overall, it is concluded that there will be no LSE[1] arising from Morven South during the construction, O&M or decommissioning phases.

15.16.1.4 Table 15.20 presents a summary of the potential cumulative impacts, mitigation measures and the conclusion of LSE[1] on aviation (military and civil) in EIA terms. The cumulative effects assessed include:

- creation of physical obstacle to aircraft operations;
- wind turbines causing interference to aviation radar.

15.16.1.5 Overall, it is concluded that there will be no likely significant cumulative effects either from Morven South alongside other projects/plans, or from a whole project assessment.

15.16.1.6 No likely significant transboundary effects have been identified in regard to effects of Morven South.

Table 15.19: Summary of Likely Significant Effects, mitigation and monitoring

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Description of impact	Phase			Designed-in measures	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional mitigation measures	Significance of residual effect	Proposed monitoring
	C	O	D							
Creation of physical obstacle to aircraft operations	✓	✓	✓	Notification to receptors, inclusion on relevant aviation charts and documentation and marking and lighting of wind turbines to regulatory requirements.	Low	Medium	Minor adverse	None	N/A	None
Wind turbines causing interference to aviation radar systems		✓		N/A	High	Very High	Major adverse	**NERL** Radar blanking via commercial agreement between the Applicant and NSL, creation of a TMZ via application to the CAA by the Applicant. **MOD** Deployment of ADR mitigation provided via the MOD Programme NJORD.	Minor adverse	None

Table 15.20: Summary of likely significant cumulative environment effects, mitigation and monitoring

C= Construction, O= Operations and Maintenance, D= Decommissioning phases

"✓" is used to denote the phase the potential impact can occur, "X" outlines there is no impact within this project phase

Description of impact	Phase			Designed-in measures	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Significance of residual effect	Proposed monitoring
	C	O	D							
Creation of physical obstacle to aircraft operations	✓	✓	✓	Notification to receptors, inclusion on relevant aviation charts and documentation and marking and lighting of wind turbines to regulatory requirements.	Low	Medium	Minor adverse	None	N/A	None
Wind turbines causing interference to aviation radar systems	x	✓	x	N/A	High	Very High	Major adverse	**NERL** Radar blanking via commercial agreement between the Applicant and NSL, creation of a TMZ via application to the CAA by the Applicant, and industry led strategic solutions. **MOD** Use of a NAIZ via commercial agreement between the Applicant and the MOD, or employment of mitigations provided via the MOD Programme NJORD, and industry led strategic solutions	Minor adverse	None

15.17 References

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